(BSP October 13, 2003)

Steel bars, plates and shapes shall conform to ASTM A 36M, except that structural shapes may conform to ASTM A 992M.

Welded shear studs shall conform to Section 9-06.15.

Epoxy bonding agent, where shown in the Plans for bonding steel components to concrete, shall be Type II as specified in Section 9-26.1. The grade and class of epoxy bonding agent shall be as recommended by the bonding agent manufacturer and approved by the Engineer.

All steel components and assemblies for seismic restrainers, except as otherwise specified, shall be galvanized after fabrication in accordance with AASHTO M 111.

Bolts, nuts, and washers shall conform to Section 9-06.5(3), and shall be galvanized after fabrication in accordance with AASHTO M 232.

Resin bonded anchors for seismic retrofit components and assemblies shall conform to Section 6-02.3(18) as supplemented in these Special Provisions, and the following requirements:

The resin bonded anchor system shall include the nut, washer, and threaded anchor rod which is installed into hardened concrete with a resin bonding material. The resin bonded anchor system shall conform to the following requirements:

1. Threaded Anchor Rod and Nuts

   Threaded anchor rods shall be fully threaded, shall include the appropriate supplemental requirements for grade and manufacturer's identification, and charpy impact testing (20 newton-metres minimum at 5C), and shall conform to either ASTM A 193M Grade B7M, or ASTM F 1554 Grade 105. Results of the charpy impact testing for the production lot(s) including the anchor rods furnished for seismic retrofit components and assemblies shall be submitted to the Engineer with the manufacturer's certification of compliance in accordance with Section 6-02.3(18) as supplemented in these Special Provisions.

   Nuts shall conform to AASHTO M 291M, Grade 10 F or AASHTO M 291, Grade DH.

   Washers shall conform to ASTM F 436M or AASHTO M 293.

   Nuts and threaded anchor rods shall be galvanized in accordance with AASHTO M 232. Galvanized threaded anchor rods shall be tested for embrittlement after galvanizing, in accordance with Section 9-06.5(4).

   Threaded anchor rods used with resin capsules shall have the tip of the rod chiseled in accordance with the resin capsule manufacturer's recommendations. Galvanized threaded rods shall have the tip chiseled prior to galvanizing.

2. Resin Bonding Material
Resin bonding material shall be one of the following:

a. Vinylester resin.

b. Polyester resin.

c. Methacrylate resin.

d. A two component epoxy bonding agent which meets the requirements of ASTM C 881, Type IV. The grade and class of the epoxy bonding agent shall be as recommended by the epoxy bonding agent manufacturer and as approved by the Engineer.

3. Ultimate Anchor Tensile Capacity
Resin bonded anchors shall each have the following minimum ultimate tensile load capacity when installed in concrete having a maximum compressive strength of 42 megapascals at the embedment specified below:

Anchor Diameter (mm)	Tensile Capacity (kN)	Embedment (mm)
M10	34.7	90
M12	55.2	110
M16	84.5	145
M20	121	180
M22	142	200
M24	182	215
M32	310	290